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INFORMATION CIRCULAR

SUGGESTED HOISTING-SIGNAL CODE FOR SLOPE COAL MINES AND FOR SHAFT MINES HAVING ONLY ONE LEVEL

BY

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SUGGESTED HOISTING-SIGNAL CODE FOR SLOPE COAL MINES AND FOR SHAFT MINES HAVING ONLY ONE LEVEL[1]

By D. Harrington[2] and J. H. East, Jr.[3]

INTRODUCTION

The code of hoisting signals for use in mines hoisting from one level, as suggested in this publication, is submitted to induce consideration of this subject by representative groups of the coal-mining industry, such as the Mine Inspectors Institute of America, National Coal Association, American Mining Congress, and others, as well as to furnish a code of signals for use in those mines operated in States that do not have regulatory hoisting codes in their mining laws or regulations.

The signal codes described in this publication apply only to mines hoisting from one level and to slope mines. Mines that hoist from more than one level are referred to Bureau of Mines Information Circular 7289, Suggested Hoisting-Signal Code For Metal-Mine Shafts, which suggests signals for hoisting from various levels or stations.

A uniform hoisting-signal code for coal mines and other mines that hoist from only one level has not been adopted by the coal-mining industry, and only a few States have adopted adequate laws or regulations governing hoisting-signal codes. The result has been that mines in different States, and even neighboring mines in the same district or belonging to the same company, often use different signal codes; and accidents to men and property as well as costly delays have been caused by confusion in connection with the meaning of the signals. Many miners move from one mine to another because of mines closing down, slack working time, or other conditions, and it is necessary for them to learn the hoisting signals at each mine, except in the few States that have adopted a standard code.

Reliable mechanical and electrical signaling devices have been developed, and some attention has been given to the formulation of safety rules; both are important factors in the safety and economy of hoisting operations. If a uniform hoisting code were adopted by the various coal-mining States and by the coal-mining industry much of the present confusion would be avoided.

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[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7291."
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Individual mine-signal codes may be well-adapted to the conditions at any certain mine, but when a given signal at one mine calls for a different hoisting operation than at another mine, it is bound to be confusing to newly employed workers. Hoisting accidents are almost sure to result, and many are known to have occurred.

The signal codes adopted by the coal-mining States vary almost as much as the codes adopted by individual mining companies. For example, 1 bell or whistle indicates "hoist" in one State, but 1 bell indicates "stop" in another while a 2-bell signal indicates "hoist." The State codes are sometimes inadequate; moreover, some codes have special signals for certain operations apart from hoisting, such as "Reverse the fan," "Turn the steam or air on or off," and "Call for a stretcher"; these operations should be handled preferably by telephone, as there is much less chance of misunderstanding. Most States require the use of telephones in mines, and practically all large mining companies have installed them at strategic points in the mine connected with the surface as an operating economy as well as a safety measure. It is probable that special signals other than those directly concerned with hoisting date back to the days when the use of telephones underground was uncommon. The hoisting-signal codes of selected States are shown at the back of this publication.

Suggested Code of Hoisting Signals for Coal or Other Mines Hoisting from One Level Through Steep Inclines or Shafts

Signals to Hoisting Engineers

1 bell or whistle - Hoist, when cage or skip is at rest.

1 bell or whistle - Stop, when cage or skip is in motion.

2 bells or whistle - Lower cage or skip.

3 bells or whistle - Hoist or lower men. Hoisting engineer must return signal before men mount cage or skip. After men are on cage signal the hoisting engineer "1 bell" to hoist or "2 bells" to lower.

4 bells or whistle - Hoist or lower cage slowly. Hoist engineer must return signal. Then signal hoisting engineer "1 bell" to hoist or "2 bells" to lower.

5 bells or whistle - Hoist or lower cage or skip to ground landing. Hoist engineer must return signal. Then signal hoisting engineer "1 bell" to hoist or "2 bells" to lower.

6 bells or whistle - Hold cage stationary until signaled otherwise.

ignals from Hoisting Engineer

1 bell - Signal understood. Give appropriate signal to hoist or lower.

2 bells - Send away empty cage.

Three-, four-, and five-bell signals all require a return signal from he hoisting engineer. After the return signal is received, the appropriate ignal to hoist or lower is given by the cager or person using the cage or kip.

The signal "3 bells" signifies men are to be hoisted or lowered. The en should not be permitted to get onto the cage until after the return ignal is received. After the men are safely on the cage the signal "1 ell" is given if the cage is to be hoisted or "2 bells" if the cage is to e lowered.

The signal "4 bells" generally is used when there is danger in moving he cage at the normal speed, or if it is desirable to move the cage slowly. he hoisting engineer returns the signal, and the proper signal to hoist or ower is then given. This procedure makes certain that the hoisting ngineer understands the cage is to be moved slowly.

The signal "5 bells" is used when it is desired to stop the cage at he ground level at the surface. The hoisting engineer returns the sig- al, and the appropriate signal to hoist or lower is given. This signal s used when supplies or materials are to be loaded or unloaded at the urface landing.

The signal "6 bells" is used when the cage or skip must not be moved ntil a second signal is given. An example of the use of this signal is ring shaft repairs.

The cage should be released to the hoisting engineer by giving 1 bell ter men have been hoisted or lowered in those cases when a cager is not duty, as on idle days or on off-shifts.

The hoisting engineer should not move the cage from the bottom landing til it has been released by receiving 1 bell from the bottom, or until he ils to receive a reply to his repeated 2-bell signal. When the hoisting gineer is satisfied there is no one at the bottom landing, he should lift e cage a few inches and then pause before taking away the cage.

No work of any kind other than normal hoisting operations should be arted in a shaft or slope until the hoisting engineer has been fully in- rmed as to its character and location. He should be notified immediately ter such work is completed and it is safe for normal shaft operations to ntinue.

SLOPE MINES

The electric signaling system usually employed in slope mines consists of two bare parallel wires suspended along the slope and connected to an electric bell in the hoist room. The signal bell rings when the trip or rope rider closes the circuit by placing a pointed metal rod with an insulated handle across the two wires. Some mines equip the permanent stations, such as the working entries and partings, with push-bottom signals and use the metal signal rod only at remote locations away from regular stations.

The same general hoist signal code is recommended for use in slope mines as in shaft mines, except that a return signal is not given by the hoist engineer.

Slope Hoisting-Signal Code

1 bell - Hoist, if trip is standing.

1 bell - Stop, if trip is in motion.

2 bells - Lower trip, if trip is standing.

3 bells - Hoist or lower men. After men are loaded in cars, give hoisting engineer appropriate signal of 1 or 2 bells to hoist or lower.

4 bells - Hoist or lower slowly. Appropriate signal of "1 bell" to hoist or "2 bells" to lower is given when the trip is ready to move.

Slope mines hoisting from several lifts or levels along the slope usually equip each landing with a telephone. The rope rider notifies the hoist engineer by telephone at which level the trip is to be placed. The trip is not moved until the appropriate signal to hoist or lower is given. Special movements of the trip are arranged by telephone with the hoist engineer, but in every case where the telephone is used in conjunction with the electric signal, the actual movement of the trip is controlled by the proper electric signal.

Some slope mines, where hoisting is from several different levels, have separate signals for each level or lift. This practice makes the signal code more cumbersome, and it is generally not as satisfactory as using the telephone in conjunction with the electric signal.

The signal wires in some slope mines hoisting from several levels are placed within easy reach of the rope rider, and the hoisting speed is slow enough for the rope rider to give the "slow" signal before arriving at the desired level. This practice is not considered as safe or as satisfactory as using a telephone in conjunction with the electric signal.

The hoisting-signal code should be posted prominently at all stations where men load or unload from man-trips and should be posted within view of the engineer. Some companies post the hoisting signal code at various places where the men congregate, such as change houses, lamp and time houses, and shops.

Thorough understanding of the hoisting-signal code is very important in any mining operation using hoists, but it is particularly important in coal mining where the handling of large tonnages is more common than in other types of mining. A uniform hoisting code that is adopted by the various States and by the coal-mining industry would be effective in reducing or eliminating accidents caused by misunderstood signals.

SAFETY RULES

1. Signal wires should not be placed on the same side of a slope as power wires.

2. Signal wires should be placed in conduit where there is danger of their coming in contact with high tension power lines.

3. The voltage used in electric signaling systems should not exceed 24 volts.

4. Signal wires should be suspended on insulators and should not be allowed to be in contact with the roof or walls at any point.

5. Signal wire supports should be placed sufficiently close together to hold the wires taut and the wire supports should be replaced promptly and wires tightened after roof falls which remove supports or loosen the wires.

6. Man-trips on slopes:

   a. The men should not be permitted to enter the man cars until after the signal "3 bells" has been given to indicate to the hoist engineer that men are to be handled.

   b. The signal to hoist or lower the man-trip should not be given until the rope rider is sure that all the men are safely seated. Riding on bumpers between cars on a trip should not be allowed.

   c. The rope rider should ride in such a place on the man-trip that he can readily signal the hoist engineer in case of an emergency.

   d. Men should not be permitted to unload from the man-trip until it has been brought to a full stop.

7. Man-trip in shafts:

a. Men should not be permitted to mount a cage until the signal for handling men has been given and the hoist engineer has returned the signal.

b. The signal to hoist or lower the cage should not be given until the cager is sure the men on the cage are in a safe position and not more than the number of men are on the cage than is permitted by the company safety rules or state laws or regulations.

c. A cager should be on duty at the top and bottom of the shaft when man-trips are handled to give the proper signals and to supervise the loading and unloading of the men.

8. Mines that are equipped with telephones at the man-trip stations should require the cager or rope rider to inform the hoist engineer that men are to be handled before the usual electric signals are given. Preferably all mines, and especially shaft mines, should have mine-type telephones at shaft stations with connection to the hoist.

Pennsylvania Signal Code (Bituminous Mines) 1940

One rap or whistle - to hoist coal.

One rap or whistle - to stop car or cage when in motion.

Two raps or whistles - to lower car or cage.

Three raps or whistles - to hoist persons. The engineer shall signal back when ready, after which the person shall get on the car or cage, and then one rap or whistle shall be given to hoist.

Four raps or whistles - to turn on steam to the pumps.

Ohio Signal Code

Effective September 2, 1941

From the Bottom to the Top

(One ring or whistle) - One ring or whistle from the bottom to the to shall signify to hoist coal or the empty cage and also stop either when in motion.

(Two rings or whistles) - Two rings or whistles shall signify to lower cage.

(Three rings or whistles) - Three rings or whistles shall signify that men are coming up; when return signal is received from the engineer, men will get on the cage, and cager shall ring or whistle one to start.

(Four rings or whistles) - Four rings or whistles shall signify to hoist slowly, implying danger.

(Five rings or whistles) - Five rings or whistles shall signify accident in the mine and a call for a stretcher.

From the Top to the Bottom

(One ring or whistle) - One ring or whistle from the top to the bottom shall signify: All ready, get on cage.

(Two rings or whistles) - Two rings or whistles shall signify: Send away empty cage.

Additions to signal code can be made with consent and approval of deputy mine inspector.

Illinois Signal Code

Revised - July 1941

From the Bottom to the Top

(One ring or whistle) - One ring or whistle shall signify to hoist coal or the empty cage, and also to stop either when in motion.

(Two rings or whistles) - Two rings or whistles shall signify to lower cage.

(Three rings or whistles) - Three rings or whistles shall signify that men are coming up or going down; when return signal is received from the engineer the men shall get on the cage and the proper signal to hoist or lower shall be given.

(Four rings or whistles) - Four rings or whistles shall signify to hoist slowly, implying danger.

(Five rings or whistles) - Five rings or whistles shall signify accident in the mine and a call for a stretcher.

(Six rings or whistles) - Six rings or whistles shall signify hold the cage perfectly still until signaled otherwise.

From Top to Bottom

(One ring or whistle) - From top to bottom, one ring shall signify: All ready, get on cage.

(Two rings or whistles) - Two rings or whistles shall signify: Send away empty cage.

Additional signals can be added to the code with the consent of the inspector.

Colorado Signal Code

Amended 1937

1.- bell - Hoist, when engine is at rest.

1 - bell - Stop, when engine is in motion.

2 - bells - Lower.

3 - bells - Men are ready to get on cage; upon receiving the signal that men are ready to get on cage, the engineer must answer by one bell or whistle, or by raising the bucket or cage a few feet and setting it back slowly, and then upon receiving the signal of one bell, he shall hoist the men away.

Special signals for other purposes may be used in any mine providing they are easily distinguishable by their sound or otherwise from the foregoing code and do not in any way interfere with it.

New Mexico Shaft Hoist Signals

Effective March 1933

Hoist	1 Bell
Hoist slowly	1 Long bell
Lower	2 Bells
Lower slowly	1-1 Bells
Stop if in motion	1 Bell
Stop at air-shaft collar	2-2 Bells from cager.
Stop at air-shaft landing	1 Light from top man after cage is in motion
Hoist men	3 Bells, which must be answered by 1 bell from engineer before men board cage. After receiving answer 1 bell is signal to hoist.

Lower men	3 Bells, which must be answered by 1 bell from engineer before men board cage. After receiving answer 2 bells is signal to lower.
Spot cage	Cager is to notify top man by phone; top man signals engineer. Five bells to spot cage, which must be answered by 3 bells from engineer to cager after cage is spotted. Cager to give all signals before top man.

Signals for Slopes, Inclines

1 Ring	Stop or start.
2 Rings	Lower trip.
3 Rings	Lower slowly.
4 Rings	Hoist slowly.
5 Rings	Hoist, injured man.

Special signals may be used if they do not interfere with code.

Federal Geological Survey Operating Regulations - 1938 Edition Signals and Telephones

Sec. 48

A code of hoisting signals shall be kept posted in a manner easily read at the top of each hoisting shaft or slope, at each landing, and in the hoisting engine house. Said code shall be in accordance with the requirements of the mining laws of the State in which the mine is situated, and if not otherwise specified, the following code of signals shall be used: (a) When the engine is at rest, one signal, hoist; (b) when the engine is in motion, one signal, stop; (c) when the engine is at rest, two signals, lower; (d) when the engine is at rest, three signals, men ready to get on the cage or cars to ascend; when this is followed by return signal from the hoist man, the men get on the cage or into cars and then the proper signal shall be given. Other signals to suit local conditions may be added by the lessee.